**3GPP TSG-SA3 Meeting #123 draft\_S3-252822-r-4**

**Goteborg, Sweden, 25 – 29 August 2025**

**Source: China Mobile, Johns Hopkins University,** **Deutsche Telekom, Huawei**

**Title: New Study on feasibility of decentralized trust enablement for 6G**

**Document for: Approval**

**Agenda Item: 6.3**

3GPP™ Work Item Description

Information on Work Items can be found at <http://www.3gpp.org/Work-Items>   
See also the [3GPP Working Procedures](http://www.3gpp.org/specifications-groups/working-procedures), article 39 and the TSG Working Methods in [3GPP TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm)

Title: New study on feasibility of decentralized trust enablement for 6G

Acronym:FS\_DecenTrust

{Propose an acronym. Final acronym to be confirmed at the plenary. The sign "-" is a level separator between (Feature)-(Building Block)-(Work Task). The sign "\_" can be freely used. Studies have to start by "FS\_". Each acronym level has to be simple and short, 7 characters max recommended}

Unique identifier:

{A number to be provided by MCC at the plenary}

Potential target Release: Rel-20

# 1 Impacts

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Affects: | UICC apps | ME | AN | CN | Others (specify) |
| Yes |  |  |  | X |  |
| No | X | X | X |  |  |
| Don't know |  |  |  |  |  |

# 2 Classification of the Work Item and linked work items

## 2.1 Primary classification

### This work item is a …

|  |  |
| --- | --- |
| X | Study |
|  | Normative – Stage 1 |
|  | Normative – Stage 2 |
|  | Normative – Stage 3 |
|  | Normative – Other\* |

**\* Other = e.g. testing**

## 2.2 Parent Work Item

|  |  |  |  |
| --- | --- | --- | --- |
| Parent Work / Study Items | | | |
| Acronym | Working Group | Unique ID | Title (as in 3GPP Work Plan) |
| N/A | N/A | N/A | N/A |

### 2.3 Other related Work Items and dependencies

|  |  |  |
| --- | --- | --- |
| Other related Work /Study Items (if any) | | |
| Unique ID | Title | Nature of relationship |
| N/A |  | {optional free text} |

**Dependency on non-3GPP (draft) specification:**

N/A

# 3 Justification

In TR 22.870[1], the security issues of operators struggling with the administration of security and trust establishment to enable interconnection and roaming with other operators has been studied. Similar issues also exist in intra-PLMN cases where different security domains in the core network rely on NDS/IP and NDS/AF to provide network and transport layer security protection mechanisms.

In both inter-PLMN and intra-PLMN interconnections, digital certificates are typically used as identity identifiers and the IPsec protocol is used for securing the communication between the two domains. This requires both CA (Certificate Authorities) institutions of each operator/entity at the border of the security domains to be designated as trusted.

Cross-domain certification brings about operational management cost, as well as threats of single point of failure. Moreover, it can also raise geopolitical and regulatory/governance questions, and this is a contributing factor why cross-certification is not used in the context of international roaming.

As the entire network security depends on certificates i.e., public key infrastructure and centralized CA model, a CA failure (e.g., CA compromise incident [2]) represents a serious impact to all services .

When it comes to 6G security, it is important to have a more resilient and reliable framework to support trust and security establishment across different security domains.

Thus, an efficient manner of establishing trust among inter-PLMN and intra-PLMN in 6G needs to be studied. For example, the traditional centralized trust infrastructure may be replaced with a decentralized trust foundation within and across the trust regions. With that, the 6G core network would fundamentally eliminate single point of failure and reduce the cross-domain security management burden in security certification establishment. At the same time, resilience would increase.

In addition, the increasing system complexity, driven by hybrid cloud deployments and multi-layered architectures, demands a re-evaluation of current trust and security mechanisms. It is critical to explore the possibility of decentralized trust framework and technologies that can address existing gaps while future-proofing security for emerging challenges, by offering resilience for distributed cloud and edge deployments and efficient cross-domain trust establishment.

The feasibility study of decentralized trust could serve as a security infrastructure for securing intra-PLMN NF communications, multi-domain trust establishment in intra-PLMN, inter-PLMN interconnection, and emerging decentralized applications, etc.

References:

[1] 3GPP TR 22.870, ‘Study on 6G Use Cases and Service Requirements’.

[2] DigiNotar – What went wrong? ‘https://www.keyfactor.com/blog/diginotar-what-went-wrong/’.

# 4 Objective

The objective of this study item is to:

* WT1: Identify use cases and security challenges requiring decetralized trust in 6G core network.
* WT2: Study the feasibility of decentralized trust mechanisms .
  + For inter-PLMN case, study secure, resilient, and transparent authentication mechanisms authentication mechanisms between operators.
  + For intra-PLMN case, study the feasibility of fundamental authentication framework serving the trust establishment among network elements in the same or different security domains.

NOTE：The GSMA and/or other industry organizations can undertake similar topics in similar timeframes. However, 3GPP is responsible for achieving the objectives of this study in order to ensure efforts across the organisations are aligned. It is expected that liaison communications are triggered during the study.

# 5 Expected Output and Time scale

***{If this WID covers both stage 2 and stage 3, clearly indicate the different completion dates.}***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| New specifications {One line per specification. Create/delete lines as needed} | | | | | |
| Type | TS/TR number | Title | For info  at TSG# | For approval at TSG# | Rapporteur |
| Internal TR | 33.XXX | Study on feasibility of decentralized trust enablement for 6G | Sep 2026  TSG#117 | Dec 2026  TSG#118 | TBD |
|  |  |  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Impacted existing TS/TR {One line per specification. Create/delete lines as needed} | | | |
| TS/TR No. | Description of change | Target completion plenary# | Remarks |
|  |  |  |  |
|  |  |  |  |

# 6 Work item Rapporteur(s)

TBD

# 7 Work item leadership

SA3

# 8 Aspects that involve other WGs

None.

# 9 Supporting Individual Members

|  |
| --- |
| Supporting IM name |
| China Mobile |
| Johns Hopkins University |
| Deutsche Telekom |
| AT&T |
| Boost Mobile Network |
| Verizon |
| Vodafone |
| China Unicom |
| Lenovo |
| Charter Communications |
| MITRE |
| US NSA |
| US OTD |
| CAICT |
| T-Mobile(US) |
| Huawei |